



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-------------------------------------------------------------------------------------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/736,294 | 12/15/2003 | Alpaslan Demir | I-2-0538.1US | 3739 |
| 24374 | 7590 | 06/15/2005 | EXAMINER | |
| VOLPE AND KOENIG, P.C. DEPT. ICC UNITED PLAZA, SUITE 1600 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103 | | | YUN, EUGENE | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2682 | |

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|------------------------------|--|
| Office Action Summary | Application No. 10/736,294 | Applicant(s) DEMIR ET AL. | |
| | Examiner Eugene Yun | Art Unit 2682 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 27-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-26 and 34-43 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date: ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-26 and 34-43, drawn to digital compensation, classified in class 455, subclass 63.1.
 - II. Claims 27 and 28, drawn to digital compensation in a particular mode, classified in class 455, subclass 435.2.
 - III. Claims 29-30, drawn to adjusting DC levels according to separate minimum readings, classified in class 455, subclass 303.
 - IV. Claim 31, drawn to adjusting power levels of I and Q signal components individually, classified in class 455, subclass 305.
 - V. Claims 32-33, drawn to adjusting phase difference in I and Q signals, classified in class 455, subclass 276.1.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I, II, III, IV, and V are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the

Art Unit: 2682

combination does not state specific functions of the digital baseband transmitter as the subcombination does. The subcombination has separate utility such as selecting and initializing a particular communication mode, determining the phase difference between I and Q components by comparing the power level with a previously determined power level, deactivating a signal component to determine a power level of another signal component, and determining a separate minimum detected reading of two signal components.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Scott Wolinsky on 6/10/2005, a provisional election was made with traverse to prosecute the invention of group I, claims 1-26 and 34-43. Affirmation of this election must be made by applicant in replying to this Office action. Claims 29-33 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2682

6. Claims 1, 2, 7-10, 14, 15, 20-23, 34, and 37-40 are rejected under 35 U.S.C. 102(b) as being anticipated by Mo et al. (US 2004/0219884).

Referring to Claim 1, Mo teaches a digital baseband (DBB) transmitter comprising:

- (a) an analog radio transmitter 16 (fig. 1);
- (b) a plurality of digital compensation modules 40 and 44 (fig. 1);
- (c) at least one digital to analog converter (DAC) for interfacing the digital compensation modules with the analog radio transmitter 46a and 46b (fig. 1); and
- (d) at least one controller in communication with the analog radio transmitter and each of the digital compensation modules, wherein the digital compensation modules correct radio frequency (RF) parameter deficiencies that occur in the analog radio transmitter (see paragraph [0026]).

Referring to Claim 2, Mo also teaches

- (i) a power amplifier 15 (fig. 1);
- (ii) a modulator 216 (fig. 2); and
- (iii) a power detector 228 (fig. 2).

Referring to Claim 7, Mo also teaches a digital pre-distortion compensation module having two signal inputs including an in-phase (I) input and a quadrature (Q) input, the DBB transmitter further comprising:

- (e) a low pass filter (LPF) 128 and 130 (fig. 2) coupled to each of the I and Q inputs of the digital pre-distortion compensation module.

Referring to Claim 8, Mo also teaches each LPF is a root-raised cosine (RRC) filter (see paragraph [0040]).

Referring to Claim 9, Mo also teaches the digital compensation modules include a digital direct current (DC) offset compensation module having two signal inputs including an in-phase (I) signal component and a quadrature (Q) signal component (see paragraph [0045]), the analog radio transmitter includes a modulator prone to a carrier leakage deficiency, a minimum detected reading associated with each of the signal inputs is determined, first and second DC offset compensation values are determined based on the minimum detected readings, and the digital DC offset compensation module is configured to eliminate carrier leakage associated with the modulator by adjusting the respective DC levels of the two signal inputs based on the first and second DC offset compensation values (see paragraph [0046]).

Referring to Claim 10, Mo also teaches a modulator having a local oscillator (LO) frequency at which the minimum detected readings are determined (see paragraph [0008]).

Claims 14, 15, and 20-23 have similar limitations as claims 1, 2, and 7-10.

Referring to Claim 34, Mo teaches an integrated circuit (IC) for processing signals input to an analog radio transmitter, the IC comprising:

- (a) a digital pre-distortion compensation module 44 (fig. 1);
- (b) a plurality of digital compensation modules 40 and 44 (fig. 1);
- (c) at least one digital to analog converter (DAC) 46a and 46b (fig. 1) for interfacing the digital compensation modules with the analog radio transmitter; and
- (d) at least one controller in communication with the analog radio transmitter and each of the digital compensation modules, wherein the digital compensation modules correct

Art Unit: 2682

radio frequency (RF) parameter deficiencies that occur in the analog radio transmitter (see paragraph [0026]).

Claims 37-40 have similar limitations as claims 7-10

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3-6, 11-13, 16-19, 24-26, 35, 36, and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mo in view of Wright et al. (US 6,313,703).

Referring to Claim 3, Mo does not teach also teaches a temperature sensor for monitoring a temperature reading associated with the analog radio transmitter, and at least one of the digital compensation modules is activated in response to the temperature sensor. Wright teaches a temperature sensor for monitoring a temperature reading associated with the analog radio transmitter, and at least one of the digital compensation modules is activated in response to the temperature sensor (see col. 30, lines 50-62. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teachings of Wright to said device of Mo in order to better correct RF parameter deficiencies by considering more conditions.

Referring to Claim 4, Wright also teaches a bias current sensor for monitoring a bias current reading associated with the analog radio transmitter, and at least one of the

digital compensation modules is activated in response to the bias current sensor (see col. 37, lines 39-49).

Referring to Claim 5, Wright also teaches a memory for storing a plurality of look up tables (LUTs), wherein one of the LUTs is selected for use by the digital pre-distortion compensation module in response to the temperature reading monitored by the temperature sensor (see col. 16, lines 55-67 and col. 17, lines 1-5).

Referring to Claim 6, Wright also teaches a digital pre-distortion compensation module having two signal inputs including an in-phase (I) signal component and a quadrature (Q) signal component, the power amplifier is prone to a linearity deficiency, and the digital pre-distortion compensation module is configured to distort the phase and amplitude of the I and Q signal components based on gain and phase characteristics of the power amplifier stored in the selected LUT, such that the power amplifier generates a linear response rather than a distorted response (see col. 16, lines 55-67 and col. 17, lines 1-5).

Claims 18, 19, 35 and 36 have similar limitations as claims 5 and 6.

Referring to Claim 11, Wright also teaches a digital amplitude imbalance compensation module having two signal inputs including an in-phase (I) signal component and a quadrature (Q) signal component, the analog radio transmitter includes a modulator prone to an amplitude balance deficiency, and the digital amplitude imbalance compensation module is configured to adjust the power level of one of the I and Q signal components, such that the power level of each of the I and Q signal components is the same (see col. 25, lines 11-21).

Referring to Claim 12, Wright also teaches a digital phase imbalance compensation module having two signal inputs including an in-phase (I) signal component and a quadrature (Q) signal component, the analog radio transmitter includes a modulator prone to a phase balance deficiency, and the digital phase imbalance compensation module is configured to adjust the phase of the I and Q signal components, such that the phase of each of the I and Q signal components are orthogonal to each other (see col. 25, lines 21-34).

Referring to Claim 13, Wright also teaches a modem for generating in-phase (I) and quadrature (Q) signal components which are input to each of the digital compensation modules, the DAC and the analog radio transmitter (see col. 8, lines 10-14).

Claims 16, 17, and 24-26 have similar limitations as claims 3, 4, and 11-13.

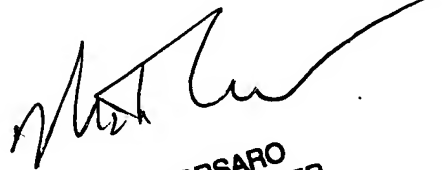
Claims 41-43 have similar limitations as claims 11-13.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Yun whose telephone number is (571) 272-7860. The examiner can normally be reached on 9:00am-6:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 272-7848. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EY

A handwritten signature in black ink, appearing to read 'Nick Corsaro', with a long horizontal stroke extending to the right.

**NICK CORSARO
PRIMARY EXAMINER**


Eugene Yun
Examiner
Art Unit 2682